Niagara Mohawk

December 6, 2000
NMP1L 1561

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

RE: Docket No. 50-220
Licensee Event Report 00-04, Supplement 1

Gentlemen:

In accordance with 10 CFR 50.73(a)(2)(iv) and 10 CFR 50.73(a)(2)(ii), we are submitting Supplement 1 to Licensee Event Report 00-04, "Manual Reactor Scram and Unusual Event Declaration Due to Stuck Open Electromatic Relief Valve and Failed Vacuum Breaker on Electromatic Relief Valve Discharge Line." Supplement 1 contains the cause of the vacuum breaker failure and corrective actions associated with the vacuum breaker failure. A revised risk assessment is also included.

Very truly yours,

LA Hopkins

Lawrence A. Hopkins
Plant Manager - NMP1

LAH/KLE/cld
Attachment

cc: Mr. H. J. Miller, NRC Regional Administrator, Region I
Mr. G. K. Hunegs, NRC Senior Resident Inspector
Records Management

IE22

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES:

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Nine Mile Point Unit 1	05000220	01 OF 05

TITLE (4) **Manual Reactor Scram and Unusual Event Declaration Due to Stuck Open Electromatic Relief Valve and Failed Vacuum Breaker on Electromatic Relief Valve Discharge Line**

EVENT DATE (5)			LER NUMBER (6)					REPORT DATE(7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR		SEQUENTIAL NUMBER		REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
10	02	00	00		04		01	12	06	00	N/A	
											N/A	

OPERATING MODE (9)	2	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check one or more of the following)* (11)

POWER LEVEL (10)				
001	☐ 20.2201(b)	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)	☐ 50.73(a)(2)(viii)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(3)(i)	☒ 50.73(a)(2)(ii)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(i)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(iii)	☐ 73.71
	☐ 20.2203(a)(2)(ii)	☐ 20.2203(a)(4)	☒ 50.73(a)(2)(iv)	☐ OTHER *(Specify in Abstract below and in Text, NRC Form 366A)*
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(1)	☐ 50.73(a)(2)(v)	
	☐ 20.2203(a)(2)(iv)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Peter A. Mazzaferro, Manager Technical Support - Unit 1	(315) 349 - 1019

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO EPIX
B	SB	PSV	Dresser Valve	Y		B	SB	VACB	Anchor/Darling	Y

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
☐ YES *(If yes, complete EXPECTED SUBMISSION DATE)*	☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines)* (16)

On October 2, 2000, during Nine Mile Point Unit 1 plant startup, at approximately 0555 hours, control room personnel identified that Electromatic Relief Valve (ERV) 111 had lifted. The plant startup was stopped and actions to close the ERV initiated. Efforts to close the ERV were unsuccessful and at 0625 hours the plant was manually scrammed. During the event, a 10-inch, ERV discharge line vacuum breaker, CKV-66-26, failed open.

The most probable cause of ERV 111 lifting was a bent pilot valve stem combined with partial disengagement of the disc and stem assembly. The cause of the vacuum breaker failure was design deficiency in that inadequate valve specifications were supplied by the Mark I Program vendor to the valve vendor.

Corrective action for the ERV lifting included checking the straightness of the pilot valve stems in the six ERVs, modifying procedures to include straightness criteria for the pilot valve stems and prohibiting the cycling of pilot valves with the solenoid in a depressurized condition, and replacing the stems in the pilot valves for ERV 111 and ERV 112.

Corrective action for the vacuum breaker failure included checking the internals of the 10-inch ERV discharge line vacuum breakers and modifying the valve hinge bumper weld in the 10-inch vacuum breakers. Additionally, a design change to correct the design deficiency will be installed by the completion of refueling outage 17.

I. DESCRIPTION OF EVENT

On October 2, 2000, during plant startup, at approximately 0555 hours, Nine Mile Point Unit 1 (NMP1) control room personnel were alerted by the acoustic monitor that Electromatic Relief Valve (ERV) 111, a steam relief valve from a main steam line to the torus, was partially open. The plant startup was stopped and actions to close the ERV initiated. At this time reactor system pressure was approximately 30 psig. Operations efforts to close the ERV were unsuccessful.

At 0625 hours a manual reactor scram was inserted by placing the mode switch to shutdown. At the time of the scram, reactor level was 67 inches, system pressure was 38 psig, and reactor power was less than one percent thermal power. All control rods fully inserted. Plant systems responded as expected for the low power condition at the time of the scram. The main steam isolation valves (MSIVs) shut as expected for the plant conditions at the time of the scram. No Emergency Core Cooling Systems actuated or were needed. At 0700 hours the torus reached the peak temperature of 79 degrees F. At 0706 hours a drywell leakage alarm was received in the control room. A Notice of Unusual Event was declared at 0712 hours when unidentified drywell leakage was confirmed to be greater than 10 gallons per minute. At 0733 hours the acoustic monitor for ERV 111 was reset, indicating that the valve had closed. At 0807 hours a shutdown cooling pump was started and NMP1 proceeded toward cold shutdown which was reached at 0900 hours. NMP1 terminated the Notice of Unusual Event at 0905 hours.

The cause of the unidentified leakage was the failure of a 10-inch vacuum breaker, CKV-66-26, in the ERV 111 discharge line to the torus. The vacuum breaker failed open when the disc stud failed allowing the disc to separate from the valve hinge. The failure of the valve hinge (swing arm) bumper allowed the disc to contact the valve body which led to fatigue failure of the disc stud. Additionally, inspection and evaluation concluded the valve hinges in the 10-inch vacuum breakers had undergone some plastic deformation.

A review of pre-scram temperature data for the ERVs indicated that the pilot valve for ERV 112 had leaked, but did not open. Also, during the disassembly of ERV 111 and ERV 112, bent stems were identified in the associated pilot valves. Additionally, the evaluation concluded that cycling of the pilot valves with the solenoid while depressurized could contribute to improper seating of the pilot valves.

II. CAUSE OF EVENT

The cause of the inadvertent lifting of ERV 111 was that the vendor manual did not provide adequate guidance for the inspection and verification of stem straightness of the pilot valve and did not caution against cycling the pilot valve with the solenoid while depressurized. Cycling the pilot valve with the solenoid without pressure can result in the stem/disc assembly becoming partially disengaged, which in combination with a bent stem, can prevent the disc from reseating, resulting in seat leakage.

The cause of the failure of vacuum breaker CKV-66-26 and the deformation of the 10-inch vacuum breaker check valves hinge (swing arm) was that inadequate valve specifications were supplied by the Mark I Program Vendor to the valve vendor. For CKV-66-26 the inadequate valve specifications led to failure of the valve hinge bumper. The valve hinge bumper is welded to the back of the valve hinge and is designed to prevent the disc from contacting the valve body. Failure of the valve hinge bumper allowed the disc to contact the valve body which led to fatigue failure of the disc stud that attaches the disc to the valve hinge.

III. ANALYSIS OF EVENT

The manual reactor scram and automatic isolation of the MSIVs are reportable in accordance with 10 CFR 50.73(a)(2)(iv), "any event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature, including the Reactor Protection System...." An engineering evaluation concluded the 10-inch vacuum breakers on the ERV discharge lines do not meet ASME Code requirements in that they were not adequately designed for transient load conditions. Even though the valves did not meet ASME Code requirements an engineering evaluation concluded that with the modification to the hinge bumper weld and operational restrictions, the valves were operable. This condition is reportable in accordance with 50.73(a)(2)(ii)(B), "Any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded; or that resulted in the nuclear power plant being: (B) In a condition that was outside the design basis of the plant."

At the time ERV 111 was identified as open the reactor pressure was approximately 30 psig and the plant startup had been stopped. At the time of reactor trip, reactor system pressure was approximately 38 psig, reactor vessel level was approximately 67 inches and power was less than one percent thermal power. On the scram signal, all rods fully inserted. There were no reactor vessel level or pressure transients associated with the trip. Reactor vessel level was maintained with the condensate and feedwater systems. The cooldown rate was maintained less than 75 degrees F per hour and approximately two and one half hours after the scram, the plant was in cold shutdown. Emergency Core Cooling Systems were available. Due to the low decay heat levels, one core spray pump could have supplied sufficient reactor vessel make up.

III. ANALYSIS OF EVENT (Cont'd)

Niagara Mohawk Power Corporation performed a probabilistic risk assessment of the event, considering a past degraded condition of the ERV pilot valve. The change in core damage frequency is 3.1E-7/year, which has very low risk significance.

Based on the information provided above, this event did not pose a threat to the health and safety of the public.

IV. CORRECTIVE ACTIONS

1. The maintenance procedure was revised to include stem straightness criteria for ERV pilot valves.

2. Pilot valves for all of the ERVs were inspected and two bent stems were replaced (ERV 111 & 112).

3. By December 22, 2000, or prior to use, the affected maintenance and surveillance procedures will be reviewed and modified as necessary to assure depressurized pilot valves are not cycled by the solenoid.

4. Each 10-inch vacuum breaker was inspected. The disc and valve hinge were replaced on vacuum breaker CKV-66-26. Based on the inspection results, the disc was replaced on vacuum breaker CKV-66-33, and the valve hinge was replaced on vacuum breaker CKV-66-34.

5. The 10-inch vacuum breaker check valves were modified to assure that the valve hinge bumpers remain intact under applicable loading conditions.

6. Procedure N1-ST-SO, "Shift Checks," was revised to require hourly checks of ERV tailpipe temperatures. This will enable operators to promptly identify conditions that could lead to cycling of a vacuum breaker.

7. A design change to correct the design deficiency for the vacuum breaker valves will be installed by the completion of refueling outage 17. However, depending upon circumstances, such as parts availability, the design change may be installed by the completion of refueling outage 16.

8. An assessment of the adequacy of other work performed by the Mark 1 Program vendor will be completed by February 28, 2001.

V. ADDITIONAL INFORMATION

A. Failed components:

1.	Electromatic Relief Valve 111 (PSV-01-102A)	Dresser Industries	Model 6-1525VX-3-NC060
2.	CKV-66-26	Anchor Darling	10-inch - 300# Swing Check Valve With Internally Balanced Disc - Vacuum Relief

V. ADDITIONAL INFORMATION (Cont'd.)

B. Previous similar events: Licensee Event Report (LER) 90-16, "Unusual Event Classification and Reactor Shutdown Due to Excess Drywell Leakage Resulting From Unadjusted ERV Pilot Valves," describes an event in which two ERVs failed because of leakage past unadjusted pilot valves and a 4-inch vacuum breaker on one of the ERV's failed open because of spring failure. The events are similar, however, the corrective actions taken for LER 90-16 would not have prevented the current event, since the causes are different.

C. Identification of components referred to in this LER:

COMPONENT	IEEE 803A FUNCTION	IEEE 805 SYSTEM ID
Main Steam System	N/A	SB
Feedwater System	N/A	SJ
Condensate System	N/A	SD
Emergency Core Cooling Systems	N/A	BL, BM, SB
Shutdown Cooling System	N/A	BO
Low Pressure Core Spray	N/A	BM
Reactor	N/A	AC
Control Rod	Rod	AA
Electromatic Relief Valve	PSV	SB
Isolation Valve	ISV	SB
Check Valve	V	SB
Vacuum Breaker	VACB	SB
Drywell	N/A	NH
Torus	N/A	NH
Pump	P	BO, BM
Acoustic Monitor	MON	SB